GREAT DESIGNS IN STEEL

INNOVATIVE STEEL BATTERY HOUSING

Sérgio Faria Rodriguez
Gestamp – Energy Unit Manager
Gestamp is a Global and Technological Supplier

Gestamp is a Spanish multinational company specialized in the design, development and manufacture of components for the leading automobile manufacturers.

**GESTAMP PORTFOLIO**

**Body in White**

**Chassis**

**Mechanisms**

**Broad Product Portfolio**

- Body-in-White, Chassis and Mechanisms
- Focus in Safety increase and Weight reduction

**Innovative Products & Technologies**

- 1 R&D Centers
- 1.500 Professionals focused on R&D

**Global Footprint**

- 2 Countries
- More than 100 industrial plants worldwide

**More than**

**130 Professionals**

**24 Countries**

**100 Industrial plants worldwide**

**Body-in-White, Chassis and Mechanisms**

**Focus in Safety increase and Weight reduction**
Global Footprint/R&D Centers
(Technology and innovation office)

In Close Proximity to OEMs' Engineering “Hubs”
GESTAMP BATTERY BOX CAPACITIES AND EXPERIENCE
Complete Structure For Battery Box Programs

Full Capability in Battery Box Development
Strong Process Assembly Knowledge
Internal Battery Box Prototype and Test Capabilities
22 Battery Box Programs Worldwide
**Future Mobility**

**Electric Vehicles**

**GESTAMP Technologies**
- Big battery box size
- Higher vehicle range
- Family Car – Private use
- Road Transport

**Different technologies required**
- Small battery box size
- Cost Driven solution
- Highly influenced by CASE
- Company Cars – Sharing or City Transport

Gestamp R&D center supports to find the best solution to the new mobility
Battery Box Innovation
Battery Box Concept Evolution

<table>
<thead>
<tr>
<th>Former Design</th>
<th>1st Concept Evolution</th>
<th>2nd Concept Evolution</th>
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<tbody>
<tr>
<td><strong>Cell To Module</strong></td>
<td><strong>Cell To Pack</strong></td>
<td><strong>Cell To Body</strong></td>
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<tr>
<td>Cells gathered in modules</td>
<td>Energy storage increase by 15%</td>
<td>Complete integration into the vehicle’s BiW.</td>
</tr>
<tr>
<td>Many single parts</td>
<td>Few and easier forming parts</td>
<td>No added parts</td>
</tr>
<tr>
<td>Complex Assembly</td>
<td>Easy Assembly</td>
<td>Safety and tightness ensured by BiW</td>
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</tbody>
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Battery Box Innovation
CELL TO PACK

CONCEPT DESCRIPTION

- Complete tight solution
- Less components = cost saving
- Increased packing efficiency

POTENTIAL

ADVANTAGES OF GESTAMP CELL TO PACK CONCEPT

01 One single Stamping Cradle
  Leak proof

02 No Cross-members
  Maximum Energy Storage

03 Standard Welding Process
  Design to Cost

04 Intensive adhesive usage
  Reduce welding distortion
Battery Box Innovation
CELL TO PACK – Product Definition

Material SELECTION

Different Steel grades were chosen for specific requirements.
The right material in the right place

1. Mild Steel
   High Formability
   Upper Cover, Battery Housing

2. High Strength Low Alloy Steel
   Higher Mechanical Properties
   Front and Rear BiW Fix Brackets

3. Dual Phase Steel
   Crash Resistance
   Lateral and Mid Longitudinal Members

Mechanical Properties (UTS)
Side Pole Test

Most significant to check the performance of the battery housings. Cell integrity must be checked after this crash event.
Battery Box Innovation
CELL TO PACK – Component Validation

Lateral crush - cae simulation

Virtual Validation
- Mechanical Shock – Acceleration in X, Y and Z direction
- Modal and Vibration Analysis
- Bollard Test – Crash Analysis for underbody protection
- Other Load cases

Top View

Lateral View

Graphical Force x Intrusion

1st Contact with Battery Flange: 35mm
Battery Box Innovation
GESTAMP Cell to Body

- **Parts Integration**
  Vehicle floor and battery box upper cover in the same part.

- **Crash Performance**
  Safety and crash performance ensured by BiW

- **Cost Reduction**
  Reduction of one big stamping part, less tooling less assembly process
Battery Box AND BIW Innovations

Battery Box Future Developments

Multi disciplinary team work

Strong collaboration between battery box and body in white team working in a complete system solution
The future concept of battery boxes need a new interpretation of the body in white. Therefore Gestamp is developing new solutions for future Electric Vehicles.

**Complete EV System Solution**

**Single part solution**

**Full vehicle EV Solution**

**Assembly concepts**

**Energy Storage Family Products**

GES-ENUBOX™

**Extreme size parts**

Ges-GIGASTAMPING™
TAKE AWAYS

Key Points

01  ✓ Cell to Pack or Cell to Body are the mainstream battery box concepts for next years

02  ✓ Gestamp is focused in complete systems as the best solutions to fulfill new EV requirements

03  ✓ Cost competitive solutions to meet crash, weight and CO₂ footprint needs to meet current and future regulations.

Your Best Partner for EV Solutions
FOR MORE INFORMATION

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